

Lactic acidosis can occur as :-

Physiological accumulation (temporary).

Pathological accumulation due to :-

- Production is increased by an increased anaerobic glycolysis.
- Use is decreased because of :-
 - Impairment of T C A cycle.
 - Impairment of gluconeogenesis.

Tissue hypoxia as in shock is the commonest cause of lactic acidosis

i.e. : cardiac arrest .

other causes

1-severe illnesses such as Leukemias and Lymphomas.

2-Drugs such as Biguanides (metformin, phenformin)

3-Glucose 6 phosphatase deficiency . Acute metabolic complications of diabetes mellitus

- Diabetic ketoacidosis ,it is precipitated by infection , vomiting , and wrong treatment i.e :
stope taking insulin (no food , no insulin)

The clinical consequences of diabetic ketoacidosis due to :

1-Hyperglycemia causing plasma hyperosmolality .

2-Metabolic acidosis .

3-glycoseuria

In diabetic hyperglycemia Plasma glucose concentration may range between 350 to 700 mg /dl, hyperglycemia cause glycosuria and hence osmotic diuresis which leads to water and electrolyte loss beside the loss because of vomiting , this will cause uremia (increase plasma urea concentration) .

Hyperosmolality cause a shift of water out of the cells → cellular dehydration .
loss of water from cerebral cells cause confusion and coma .

The rate of lipolysis increase, free fatty acids increase which either converted to ketones → ketosis, or triglycerides in VLDL → hyperlipidemia.

Hydrogen ions concentration increases and bicarbonate ions concentration decreases (acidosis) .

plasma potassium concentration may be raised despite total body deficit , so during treatment k re-enters cells and this cause sever hypokalemia (low plasma k concentration) Plasma sodium concentration low (hyponatremia) or low normal , sometimes there is pseudohyponatremia because of hyperlipidemia .

hypophosphatemia and elevated plasma and urine amylase activity.

Urine findings:- glycosuria ,ketonuria ,and low ph. .

- Hyperosmolal nonketotic coma .It is a coma In which there is marked hyperglycemia but no detectable ketoacidosis , the reason for this is not clear, it has been suggested that the activity of insulin is sufficient to suppress lipolysis but insufficient to suppress gluconeogenesis or to facilitate transport glucose into the cells . Plasma glucose concentration may exceeds 900 mg/dl ,sudden onset ,older age group . Hyponatremia is a common finding .
- Hypoglycemia caused by excess insulin or sulphonylurea administration .
- Cerebrovascular accidents are relatively common in diabetics because of vascular disease.

Investigation of diabetes mellitus

Samples to be tested

1- Venous or capillary blood

Plasma glucose concentration is measured by enzymatic method.

If a whole blood glucose concentration is measured the result will be low (wrong result) because of the dilution that occurs by the cells. Unless the test is done within one hour, glycolysis inhibitor (fluoride or iodoacetate) should be added to the sample.

Blood sample may be taken:

a-At least 10 hours after a meal.

b-Two hours after a meal.

c-At random.

d-As part of glucose load test.

2-Urine sample, collected by double void technique i.e.: the patient should empty his bladder, a further sample passed 10 to 15 minutes later is collected.

Diabetes mellites is confirmed if:

- A fasting Plasma glucose concentration 126 mg/dl or more on tow occasions.
- A random plasma glucose concentration mor than 200 mg/dl on two occasions.
- Both of fasting glucose concentration more than 126 mg/dl and random glucose concentration more than 200mg/dl.

Diabetes is excluded if a fasting plasma glucose concentration is less than 100 mg/dl on two occasions, if it is between 100 and 126 mg/dl the patient is prediabetic

3- Oral glucose tolerance test

Indications:

a-Fasting plasma glucose concentration between 100 and 126 mg/dl.

b-Random plasma glucose concentration between 126 and 200 mg/dl.

c-A high index of clinical suspicion.

- Procedure:

- a. The patient should be fast at least for 10 hours but not more than 16 hours. Only water is allowed, no smoking during the test.

- b. A venous blood is withdrawn, and urine sample is collected by double void technique.

- c. A solution of mixture of glucose and its oligosaccharides containing 75 gm of glucose should be drunk slowly by the patient over 4 minutes.

- d. Further blood sample and urine sample are collected after 2 hours.

- Plasma glucose concentrations are measured in blood samples, and urine samples are tested for glucose and ketone.

If fasting concentration is 100 mg/dl or less, and 2 hours sample 140 mg/dl or less, diabetes is unlikely.

If fasting conc. is Between 100 mg/dl and 126mg/dl and that of 2 hours between 140 mg/dl and 200mg/dl → impaired glucose tolerance .

If fasting conc. More than 140 mg/dl and of 2 hours more than 200mg/h/dl → diabetic: previous diet, time of the day and drugs.

In patient presented with coma blood sample is taken immediately and investigated for:

- Plasma glucose concentration.
- Sodium (Na) and potassium (k).
- Urea and creatinine.
- Bicarbonate.

Investigation of hypoglycemia

- If hypoglycemia is improved:

Plasma insulin concentration.

Plasma C-peptide concentration by which can differentiate endogenous from exogenous insulin.

Urine sample is tested for glucose and ketone.

- Glycosuria is best detected by Enzyme reagent strips, It may be due to:
 1. Diabetes mellites.
 2. Glucose infusion.
 3. Renal glycosuria, inherited.
 4. Pregnancy.
- Falls negative if urine contains vitamin C , and falls positive if the tube is contaminated by detergent .
- Ketonuria is done by ketostix or acetest strips

- Hb A1c (formed by nonenzymatic glycation of hemoglobin) is estimated in a whole blood sample to give an idea about plasma glucose control in the last 6 to 8 weeks, because it is dependent on RBCs life span. This test should not be used for diagnosis of diabetes mellitus, it is used for follow up to see the diabetes of the patient was well controlled during the last 6 to 8 weeks or not

Management of diabetes mellitus

Treatment of diabetic coma

- 1-Repletion of fluid and electrolytes should be vigorous. normal saline is given at first may be followed by hypo-osmolal saline.
- 2-Insulin is given I.V infusion at first then intermittent I.M then according to plasma glucose concentration.
- 3-Plasma potassium concentration should be monitored and corrected.
- 4-Treat any underlying factor such as infection.